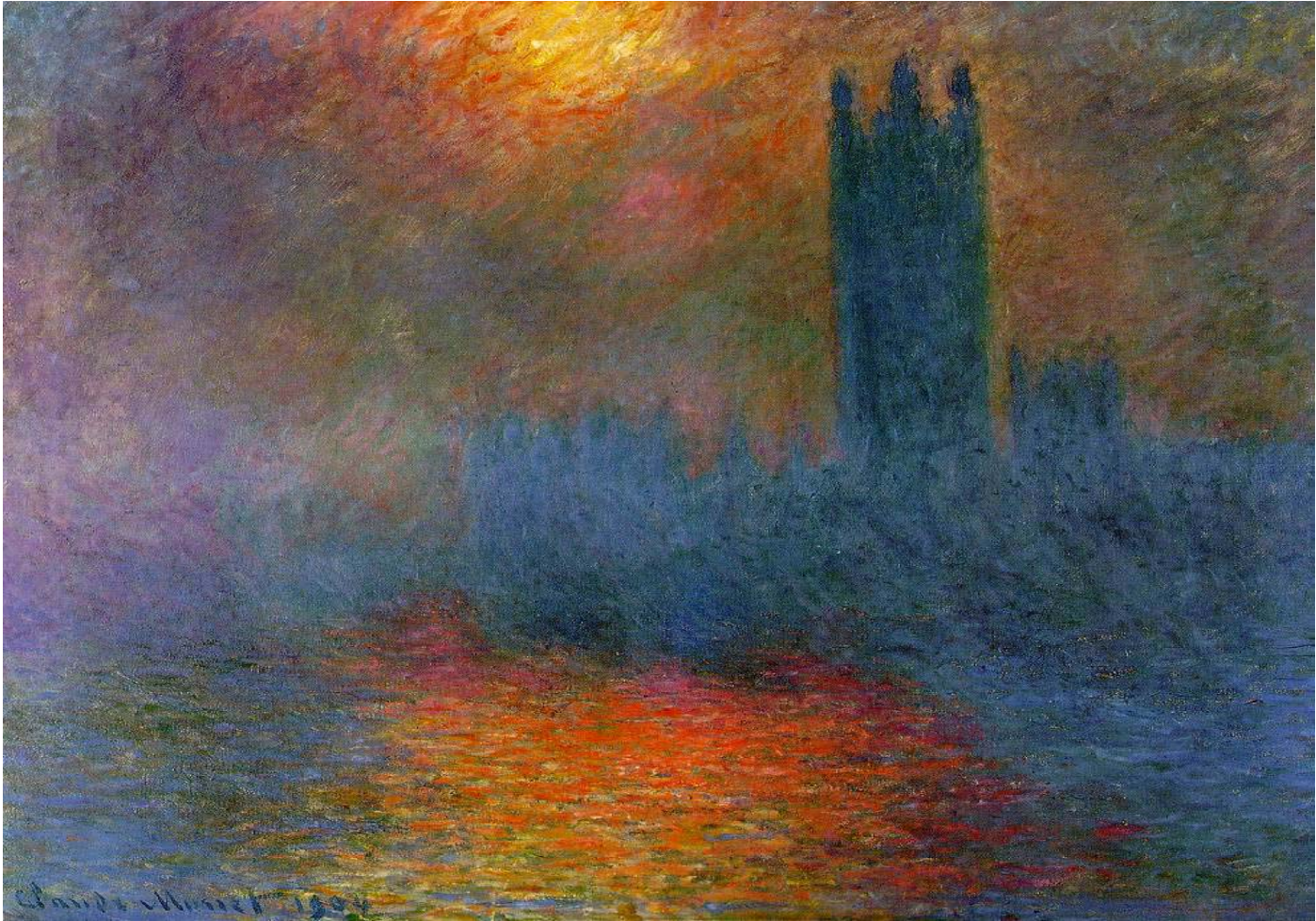


**Professor John E Thornes  
University of Birmingham UK**

**Visualising Decision Support  
Systems**







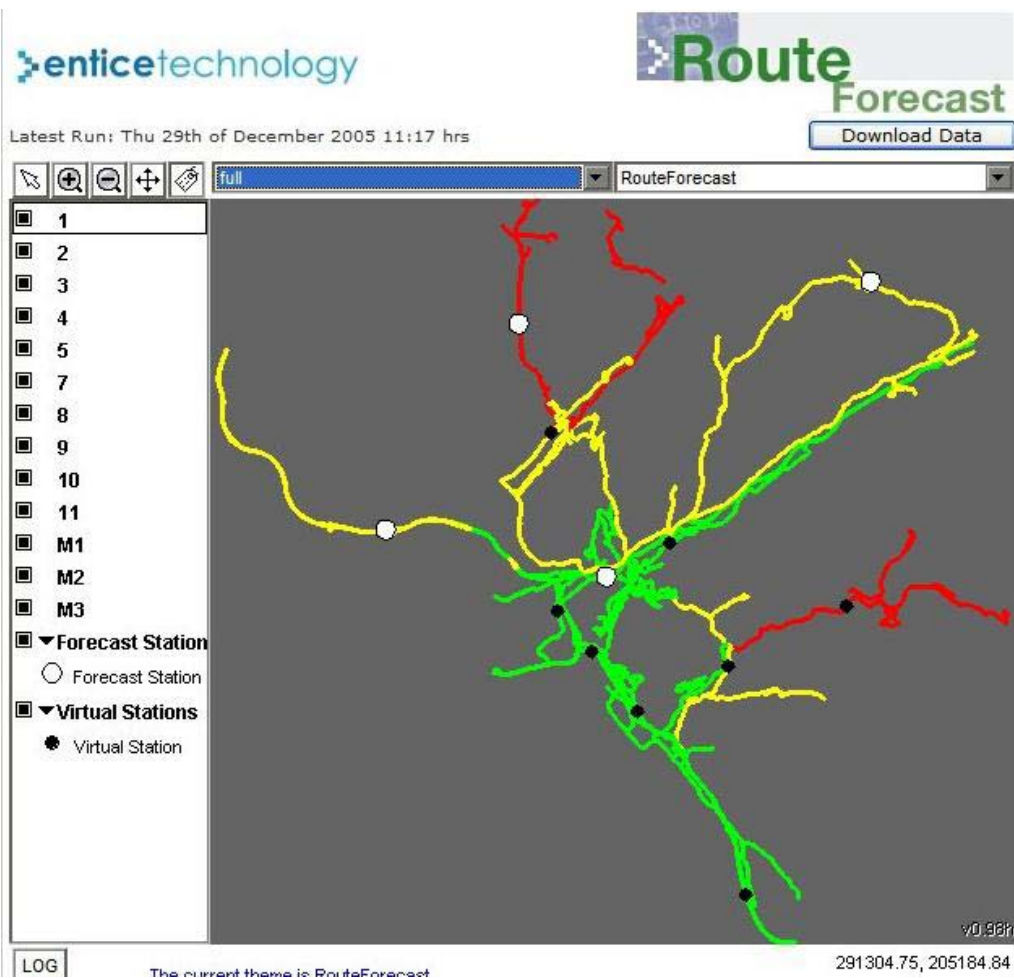
# James Turrell Skyspace 2006



# Visual Turn and Science

- A huge field – from Microscopy to Machine Vision to Optics to Imaging Systems
- Visual Culture – Visual Studies
- A Picture is worth 10,000 words!
- Visual Decision Support System VDSS:
- Encapsulates: Maps, GIS, Weather Forecasts, Satellite & Radar Images, RWIS data, x-y Graphs, Time series
- Optimise Decision Support Systems

## The Next Generation (XRWIS) RouteForecast



Actions - Microsoft Internet Explorer

Route ID	Minimum	Typical	Percent	Treat by
10	-1.9	-0.1	57%	1400h
4	-1.7	-0.2	59%	1500h
8	-0.9	0.3	22%	1600h
9	-0.9	0.2	43%	1600h
M3	-0.7	1.4	4%	1600h
5	-0.4	0.4	16%	1800h
11	-0.1	0.6	2%	1900h
1	0.5	1.4	0%	n/a
2	0.1	1	0%	n/a
3	0.1	0.8	0%	n/a
7	0.6	1.5	0%	n/a
M1	1.1	2.5	0%	n/a
M2	1.1	2.6	0%	n/a

Latest Run: Thu 29th of December 2005 11:17 hrs

**Route-by-route suggested action based on underlying RST & condition forecasts**

# Decision Algorithm

- Suggested actions colour coded per route:
  - RED** - Route requires salting  
Mean RST  $< 0$  degC & Ice/Frost/Snow Forecast
  - AMBER** - Standby: action may be needed  
Mean RST  $> 0 < 1$  degC OR RST  $< 0$  Road Dry
  - GREEN** - No salting required  
Mean RST  $> 1$  degC
- The algorithm can be customised as per customers' requirements.

# Methods of Delivery


- An increasingly mobile workforce makes providing critical information to key workers both difficult and essential.
- No longer do staff need to be present at their desk or even have access to a computer to view the latest forecasts.
- A mobile workforce can access up to date forecasts whilst on the move.
- Route Forecasts can be viewed on mobile phones and PDAs!





# Route Forecast

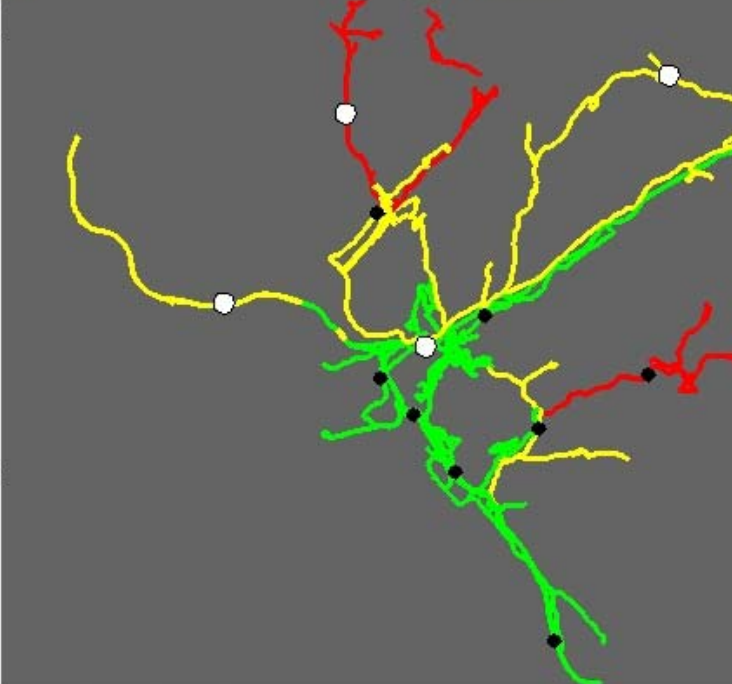
Home > RouteForecast



Latest Run: Thu 29th of December 2005 11:17 hrs

full RouteForecast

1  
 2  
 3  
 4  
 5  
 7  
 8  
 9  
 10  
 11  
 M1  
 M2  
 M3  
 Forecast Station  
 Forecast Station  
 Virtual Stations  
 Virtual Station



LOG The current theme is RouteForecast

Zoom 41031 m

Actions - Microsoft Internet Explorer

Route ID	Minimum	Typical	Percent	Treat by
10	-1.9	-0.1	57%	1400h
4	-1.7	-0.2	59%	1500h
8	-0.9	0.3	22%	1600h
9	-0.9	0.2	43%	1600h
M3	-0.7	1.4	4%	1600h
5	-0.4	0.4	16%	1800h
11	-0.1	0.6	2%	1900h
1	0.5	1.4	0%	n/a
2	0.1	1	0%	n/a
3	0.1	0.8	0%	n/a
7	0.6	1.5	0%	n/a
M1	1.1	2.5	0%	n/a
M2	1.1	2.6	0%	n/a

Latest Run: Thu 29th of December 2005 11:17 hrs

**Route-by-route suggested action based on underlying RST & condition forecasts**

OpenRoute > Home Page



**Weather Warnings:** At 19:01 there were no severe weather warnings

- Home Page
- RouteForecast
- Text Forecasts
- Forecast Graphs
- Radar
- Satellite
- 24 Hour Support
- RSS Data Feed
- Verification
- Account
- Help
- Logout

**Weather Warnings:** Details of severe weather forecast

**24 Hour Support:** Telephone contact details

**RSS Data Feed:** 'Subscribe' to RSS weather updates & alerts

**Verification:** Accuracy assessment statistics

**Account:** Manage user details, passwords, active email addresses

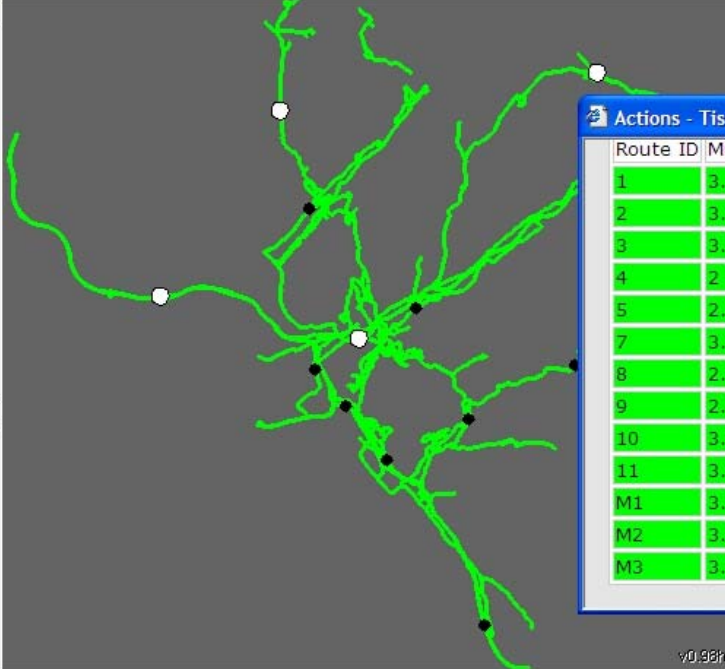
**Help:** User guide, technical contact details, glossary

Latest Run: Tue 15th of November 2005 11:46 hrs

Download Data

full RouteForecast

- 1
- 2
- 3
- 4
- 5
- 7
- 8
- 9
- 10
- 11
- M1
- M2
- M3
- Forecast Station
  - Forecast Station
- Virtual Stations
  - Virtual Station



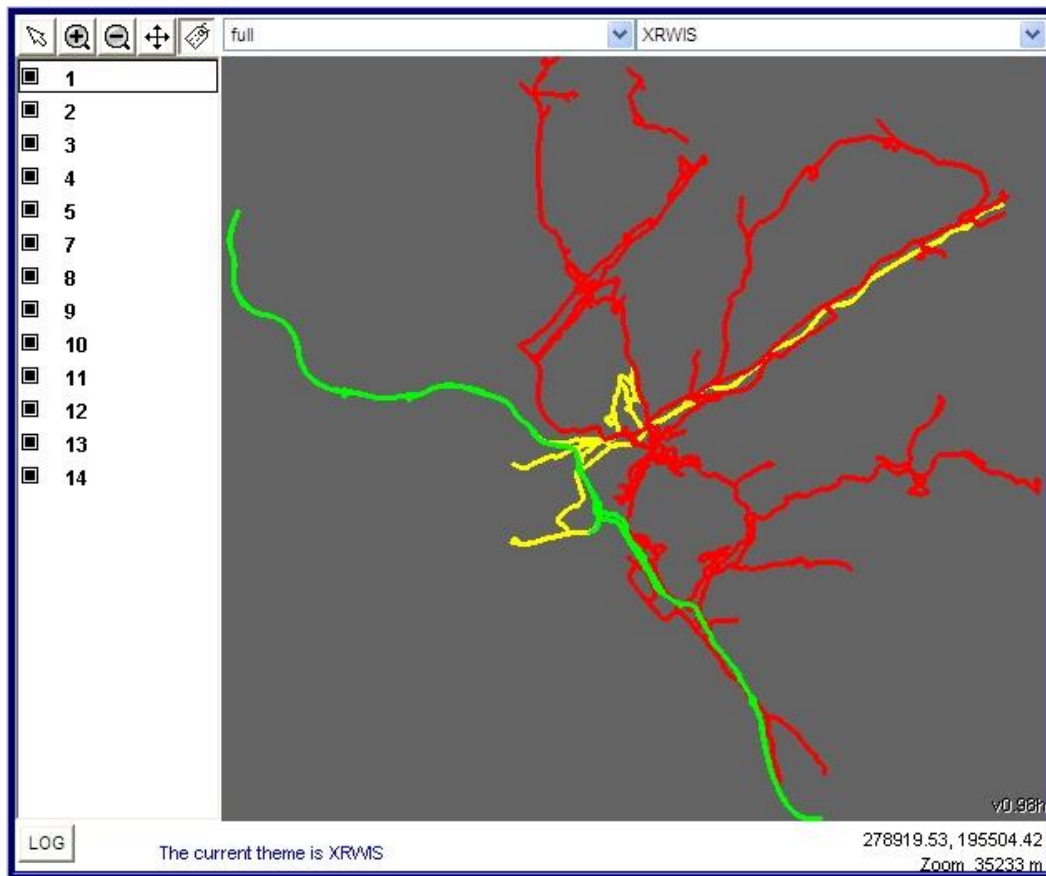
Actions - Tiscali 10.0

Route ID	Minimum	Typical	Percent	Treat by
1	3.7	5.4	0	n/a
2	3.4	4.5	0	n/a
3	3.4	5.1	0	n/a
4	2	4.8	0	n/a
5	2.7	3.2	0	n/a
7	3.3	4.1	0	n/a
8	2.5	3	0	n/a
9	2.5	4.7	0	n/a
10	3.3	6.4	0	n/a
11	3.2	4.2	0	n/a
M1	3.3	3.7	0	n/a
M2	3.9	5.7	0	n/a
M3	3.5	6	0	n/a

LOG The current theme is RouteForecast

256853.84, 203263.0  
Zoom 35233 m

## The Next Generation (XRWIS) RouteForecast

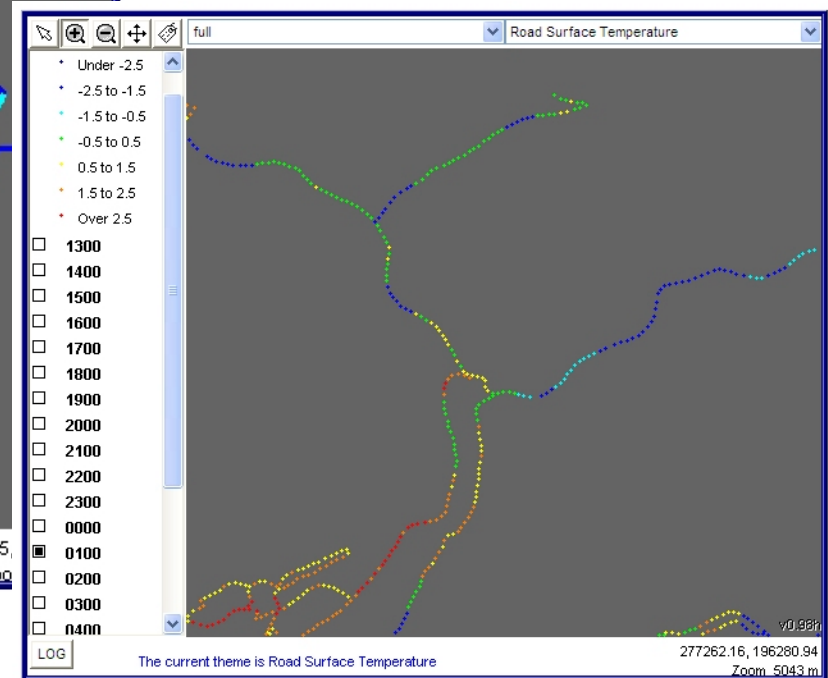
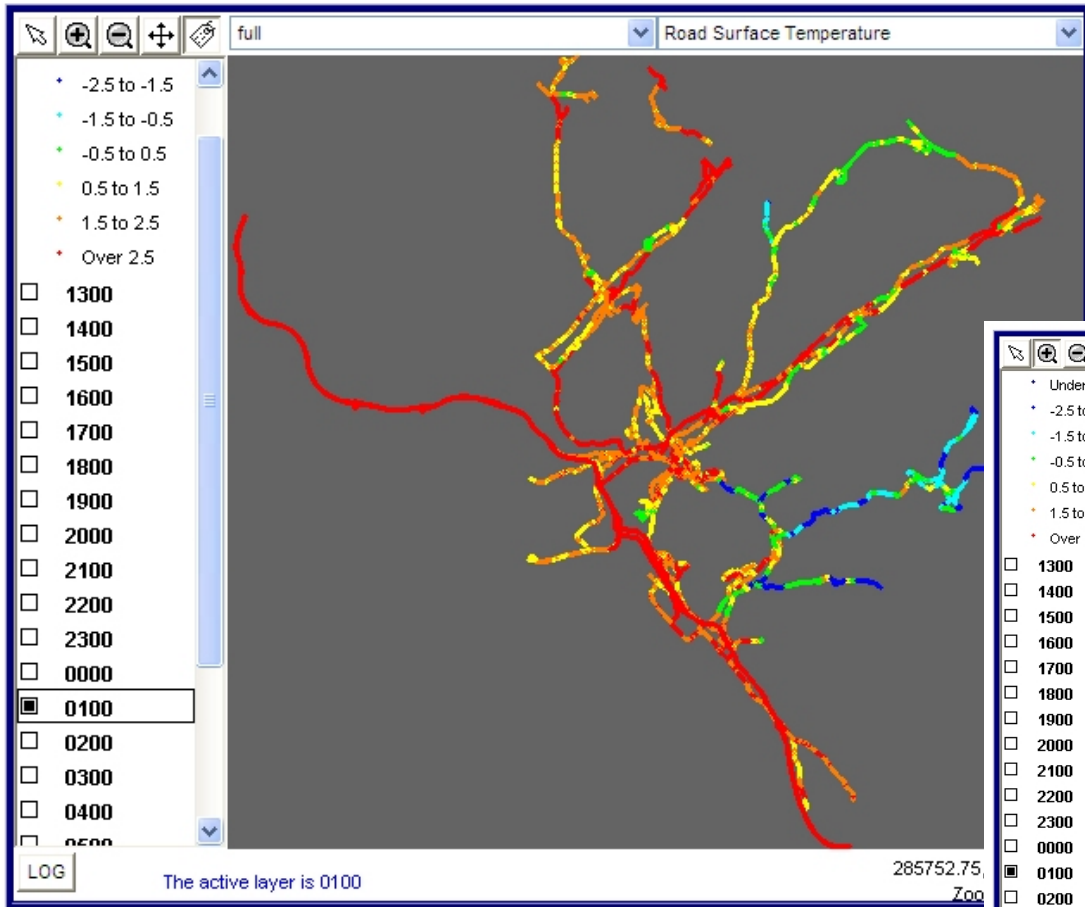


Route ID	Minimum	Typical	Treat by
1	-0.5	0.3	2100h
2	-0.6	0	1700h
3	-0.3	-0.3	2000h
4	-2.2	0.2	1400h
5	-1.4	-0.2	1700h
7	0	1.3	00h
11	-0.1	0	2300h
8	0.5	0	n/a
9	0.2	0	n/a
10	0.3	0	n/a
12	1.8	0	n/a
13	0.2	0	n/a

Done

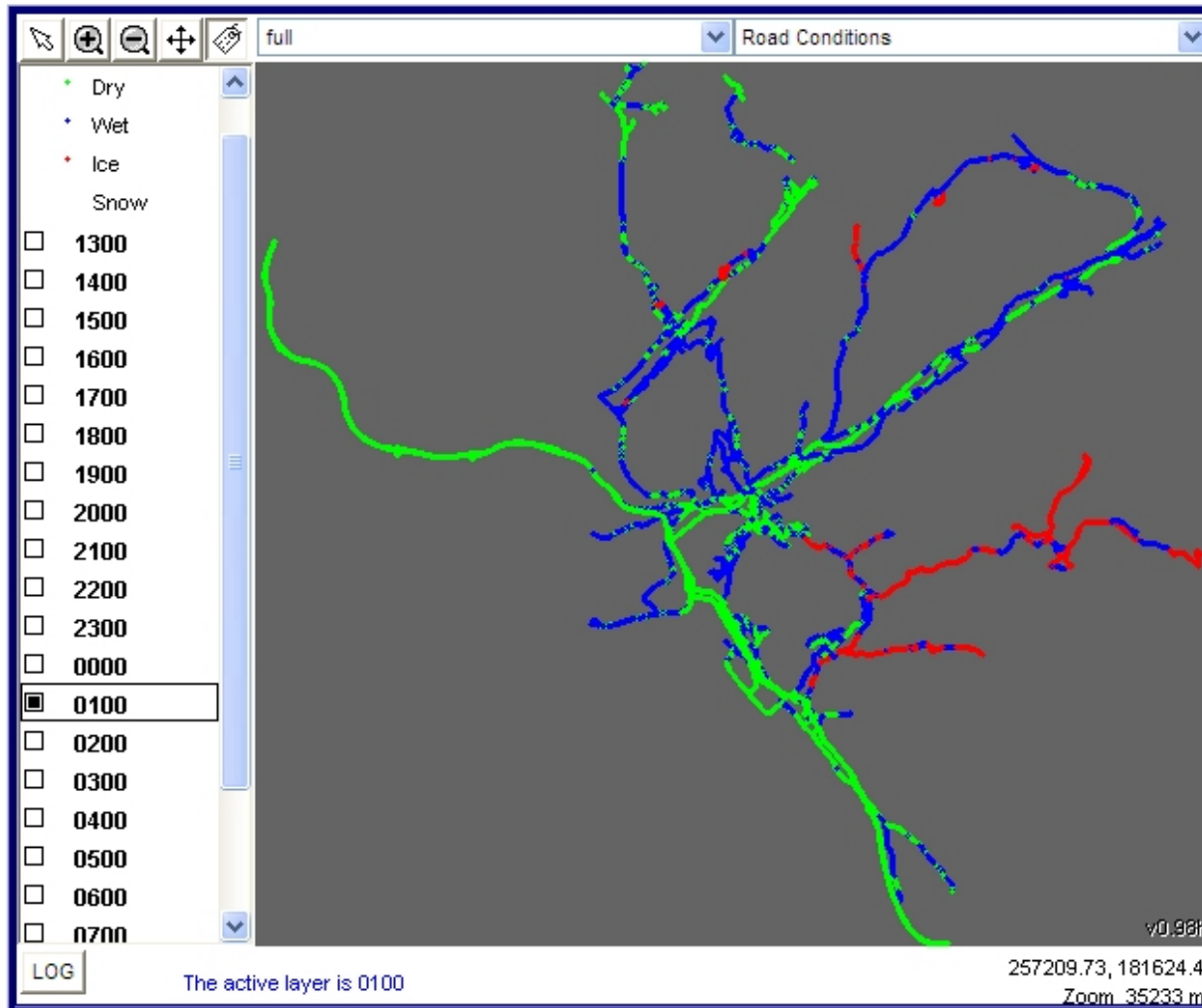
**Route-by-route suggested action based on underlying RST and condition forecasts**

# Route Forecast



Time slices of predicted RST every hour for thousands of sites around the road network

# Route Forecast



Time slices of predicted road conditions every hour for thousands of sites around the road network

## Sky-View Surveying



The Sky-View Factor (SVF) has been proven to play a dominant role in the variation of RST.

To accurately predict RST variation a forecasting system needs to include this factor.

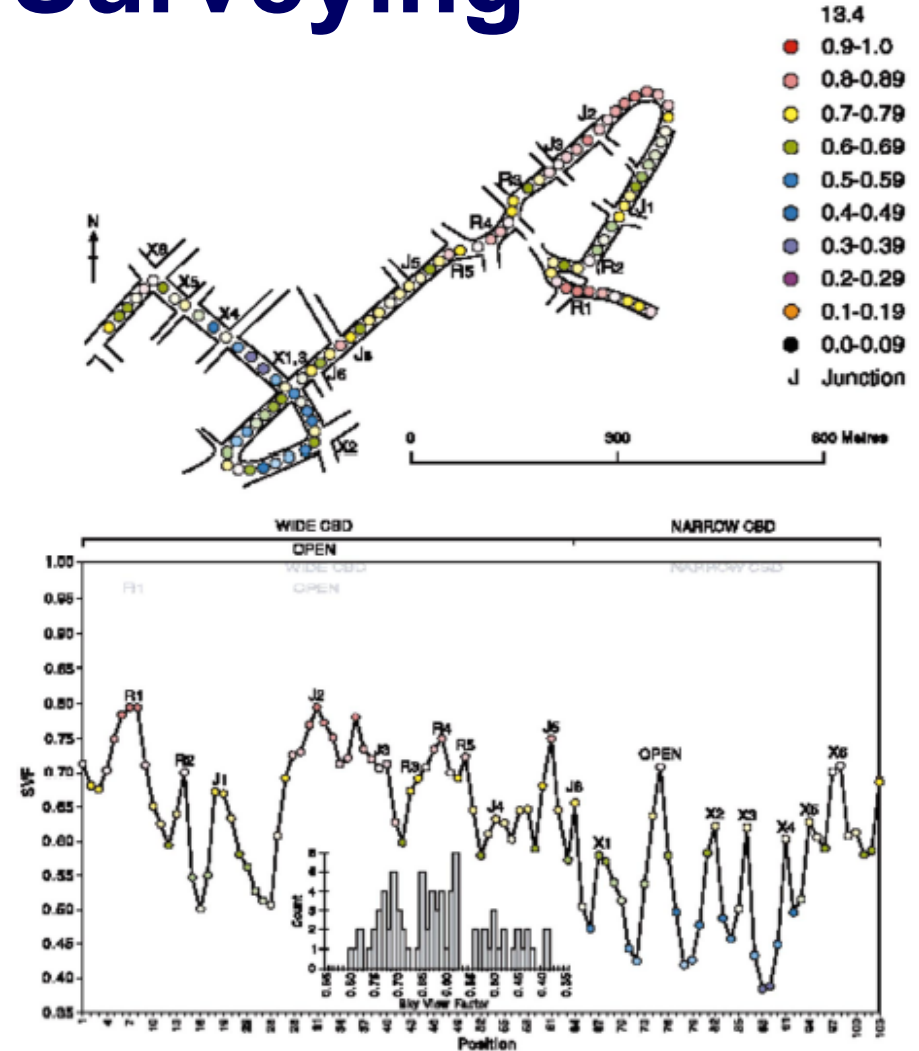


Figure 5. Sky view factor transect: central business district (CBD).

# Conclusions

## Visual Decision Support Systems will:

- Revolutionise winter maintenance with route based forecasts and decision making.
- Provide dedicated forecasts for each salting route using mesoscale model data.
- Make decisions easier, improve accuracy & safety, reduce delays and provide consistent Levels of Service.
- Lead on to selective salting and dynamic routing